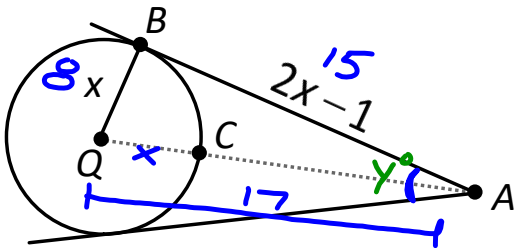
$AC = 2x - 7$

Find $m\angle A$



$x^2 + (2x-1)^2 = (3x-7)^2$

$x^2 + 4x^2 - 4x + 1 = 9x^2 - 42x + 49$

$0 = 4x^2 - 38x + 48$

$0 = 2x^2 - 19x + 24$

$0 = 2x^2 - 16x - 3x + 24$

$0 = 2x(x-8) - 3(x-8)$

$0 = (2x-3)(x-8)$

$x = \frac{3}{2}$ invalid $\quad x = 8$

$\tan y = \frac{8}{15}$

$y = \tan^{-1}\left(\frac{8}{15}\right)$

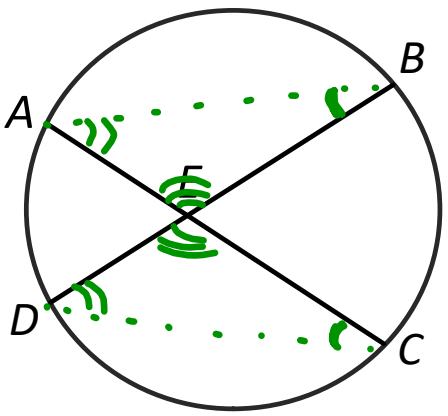
$y \approx 28.072$

$m\angle A = 2y$

$m\angle A \approx 56.144$

Theorem:

If two chords intersect in a circle, then the product of the lengths of the segments of one chord is equal to the product of the lengths of the segments of the other chord

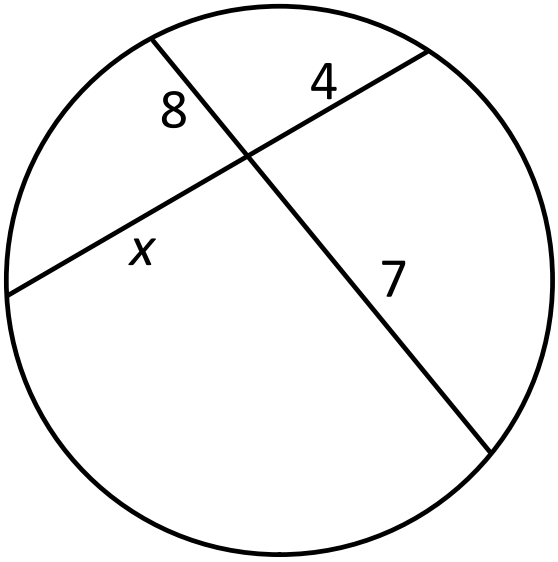


$AE \cdot EC = DE \cdot EB$

chunk · chunk = chunk · chunk

$\triangle ABE \sim \triangle DCE$ by AA

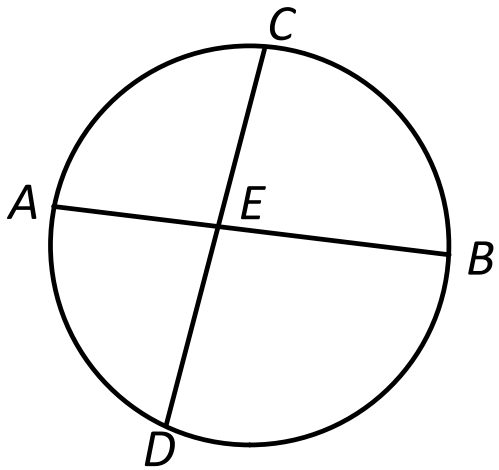
$\frac{AE}{DE} = \frac{EB}{EC}$



$4x = 8 \cdot 7$

$4x = 56$

$x = 14$



$AE = x + 2$

$BE = x + 3$

$CE = x + 1$

$DE = x + 5$

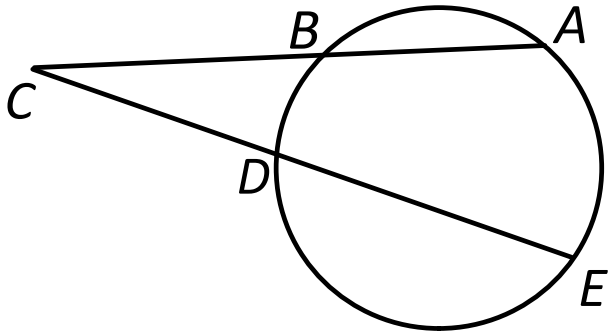
$(x+2)(x+3) = (x+1)(x+5)$

$x^2 + 5x + 6 = x^2 + 6x + 5$

$1 = x$

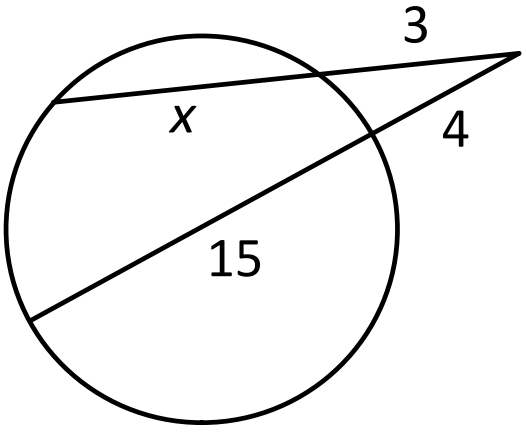
Theorem:

If two secant segments share the same external point, then the product of one secant segment and its external part is equal to the product of the other secant segment and its external part



$CB \cdot CA = CD \cdot CE$

out · whole = out · whole

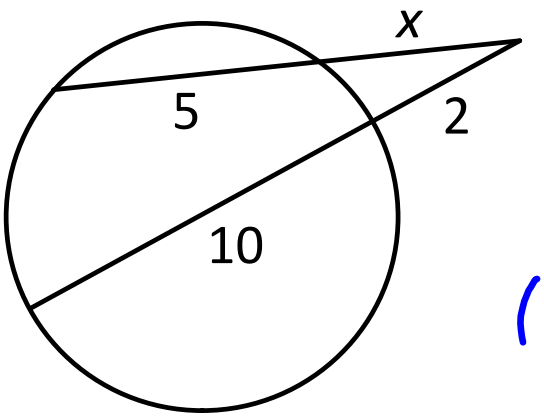


$4 \cdot 19 = 3(x+3)$

$76 = 3x + 9$

$67 = 3x$

$x = \frac{67}{3}$



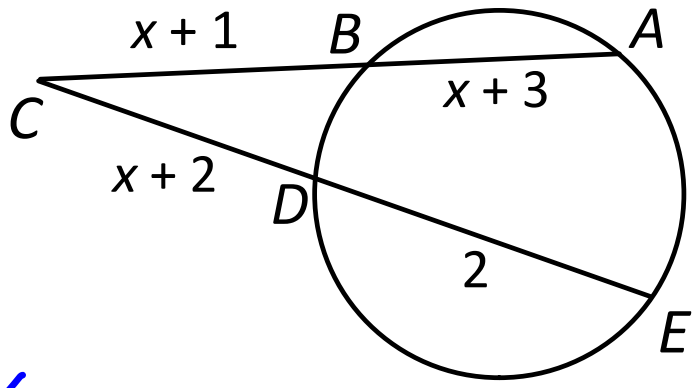
$2 \cdot 12 = x(x+5)$

$24 = x^2 + 5x$

$x^2 + 5x - 24 = 0$

$(x+8)(x-3) = 0$

$x = -8$ invalid $\quad \boxed{x = 3}$



$(x+1)(2x+4) = (x+2)(x+4)$

$2x^2 + 4x + 2x + 4 = x^2 + 4x + 2x + 8$

$x^2 - 4 = 0$

$(x-2)(x+2) = 0$

$x = 2 \quad x = -2$

$\sqrt{x^2} = \sqrt{4}$

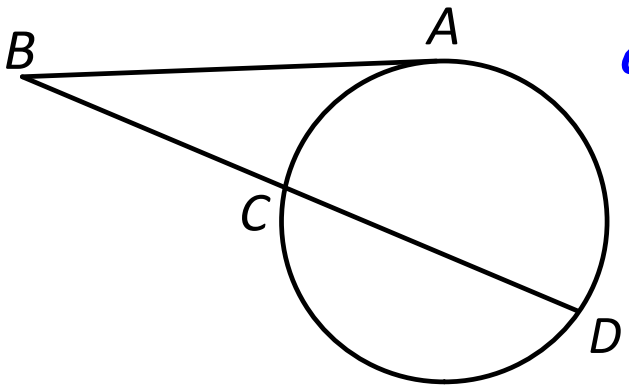
$x = \pm 2$

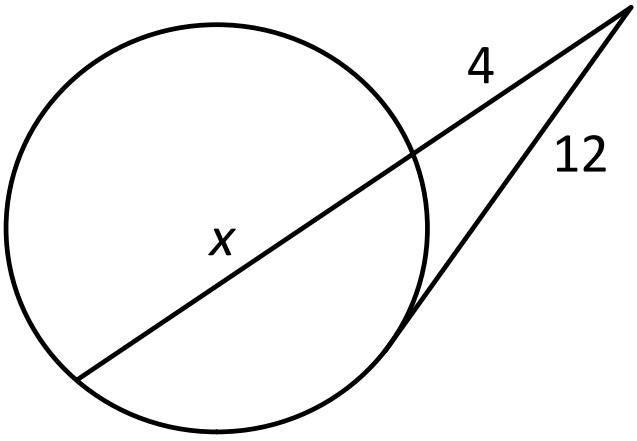
Theorem:

If a secant segment and a tangent segment share the same external point, then the product of the secant segment and its external part is equal to the square of the tangent segment

$BC \cdot BD = BA^2$

out · whole = tangent^2



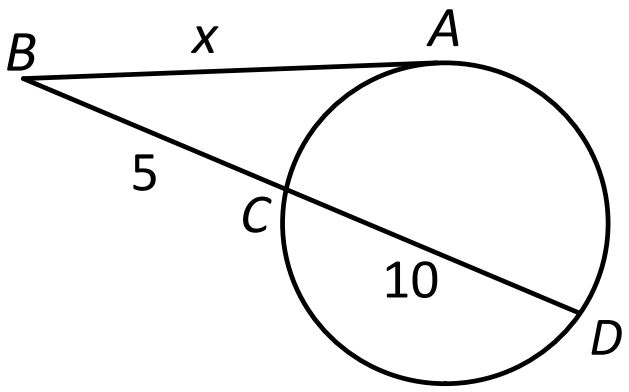


$4(x+4) = 12^2$

$4x + 16 = 144$

$4x = 128$

$x = 32$



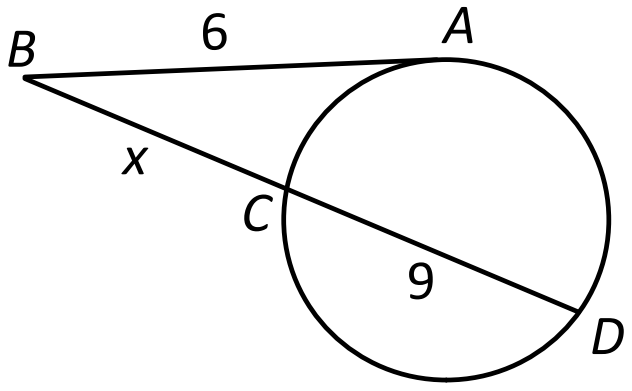
$5(15) = x^2$

$\sqrt{75} = \sqrt{x^2}$

$\pm\sqrt{3 \cdot 25} = x$

$\pm 5\sqrt{3} = x$

$x = 5\sqrt{3}$



$x(x+9) = 6^2$

$x^2 + 9x = 36$

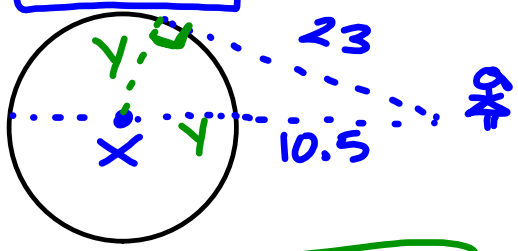
$x^2 + 9x - 36 = 0$

$(x+12)(x-3) = 0$

~~$x = -12$~~ invalid

$x = 3$

You want to estimate the diameter of a circular water tank. You stand at a location 10.5 ft from the edge of the circular tank. From this position, your distance to a point of tangency on the tank is 23 ft. Find the diameter of the tank.



$10.5(x+10.5) = 23^2$

$10.5x + 110.25 = 529$

$10.5x = 418.75$

$1050x = 41875$

$x = \frac{1675}{42}$

$2y$ = diameter